IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.:	10/693,820	Examiner:	S. Y. Paik
Confirmation No.:	1426	Art Unit:	3742
Filing Date:	October 24, 2003	Atty. Dkt. No.:	5659-20900/EBM
Inventors:	Sandberg et al.		
Title:	HIGH VOLTAGE TEMPERATURE LIMITED HEATERS		

CERTIFICATE OF ELECTRONIC TRANSMISSION
UNDER 37 C.F.R. §1.8

DATE OF DEPOSIT: July 31, 2009

I hereby certify that this correspondence is being deposited with the United States Patent Office electronic filing system on the date indicated above

Jackie L. Pitre

REPLY BRIEF TO EXAMINER'S ANSWER MAILED MAY 28, 2009

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellant herewith submits a Reply Brief in response to the Examiner's Answer mailed May 28, 2009. The Reply Brief provides a response to the "Response to Argument" (section 10) of the Examiner's Answer. The Appellant's reply in this paper follows the format according to the grounds of rejection presented in the Arguments section (section VII) of the Appeal Brief previously submitted by Appellant. Appellant respectfully requests that this Reply Brief be considered by the Board of Patent Appeals and Interferences.

I. STATUS OF CLAIMS

Claims 1-1690, 1697, 1717, and 1735 are canceled in the present application. Claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 are pending in the present application. Claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 stand finally rejected under U.S.C. 103(a). Claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting. Claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 are the subject of this appeal.

II. GROUNDS OF REJECTION

1. Claims 1691-1696, 1699-1716, 1719-1734, and 1736-1753 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,716,960 to Eastlund et al. (hereinafter "Eastlund") in view of U.S. Patent No. 5,065,818 to Van Egmond (hereinafter "Van Egmond") or U.S. Patent No. 4,382,469 to Bell et al. (hereinafter "Bell"), and European Patent Application 0130671 to Rose (hereinafter "Rose").

2. Claims 1698 and 1718 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Eastlund in view of Van Egmond, Bell, and Rose as applied to claims 1691-1696, 1699-1716, 1719-1734, and 1736-1753 above, and further in view of Canadian Patent No. 2,151,521 to Bridges et al.

3. Claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 stand as provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1691-1749 of copending U.S. Pat. Appl. No. 10/693,700 or claims 1691-1759 of copending U.S. Pat. Appl. No. 10/693,840.

III. REPLY TO "RESPONSE TO ARGUMENT" SECTION OF EXAMINER'S ANSWER

First Ground of Rejection

The Examiner rejected claims 1691-1696, 1699-1716, 1719-1734, and 1736-1753 under 35 U.S.C. 103(a) as being unpatentable over Eastlund in view of Van Egmond or Bell, and Rose. Appellant respectfully traverses these rejections in light of the following remarks. Different groups of claims are addressed under their respective subheadings.

Claims 1691, 1711, and 1731

Claim 1691 describe combinations of features including, but not limited to, the features of:

> a heater well extending from a surface of the earth through an overburden of the formation and into a hydrocarbon containing layer in the formation; ...
> at least one electrical conductor comprising one or more ferromagnetic sections, and being configured to provide an electrically resistive heat output during application of AC to the electrical conductor such that heat transfers from the electrical conductor to hydrocarbons in the hydrocarbon containing layer to at least mobilize some hydrocarbons in the layer.

Claim 1711 describe combinations of features including, but not limited to, the features of:

> a heater well extending from a surface of the earth through an overburden of the formation and into a hydrocarbon containing layer in the formation; ...
> at least one electrical conductor comprising one or more ferromagnetic sections, and being configured to provide an electrically resistive heat output during application of AC to the electrical conductor such that heat transfers from the electrical conductor to hydrocarbons in the hydrocarbon containing layer to at least mobilize some hydrocarbons in the layer.

Claim 1731 describes a combination of features including, but not limited to, the features of:

> providing AC at a voltage above about 200 volts to one or more electrical conductors located in a heater well extending from a surface of the earth through

an overburden of the formation and into a hydrocarbon containing layer in the formation, ...

allowing heat to transfer from the electrical conductors to hydrocarbons in the hydrocarbon containing layer to at least mobilize some hydrocarbons in the layer.

In the Examiner's Answer, the Examiner states that:

The appellant also argues a fluid layer that contains hydrocarbon as shown in Eastlund is not the same as the recited hydrocarbon containing layer formation, i.e., the appellant's specification states that the underground formations have different layers in them and that some of these layers do not contain hydrocarbon. This argument is not deemed persuasive since Eastlund clearly shows a heater provided in a heater well tubing wherein the heater well tubing extends into a layer formation wherein the fluid is admitted through the perforations (12, 113), and Eastlund clearly teaches for heating of the hydrocarbons in the well tubing. As stated in the ground of rejection, while Eastlund does not explicitly recite an overburden layer, but it is noted that the Van Egmond and Bell references are alternatively applied to show a well known overburden formation through which a heater well tubing extends into a layer that contains the hydrocarbon.

("Response to Arguments" (Section 10), pages 7-8).

Reply to Examiner's Answer Regarding Claims 1691, 1711, and 1731

As stated in the Appeal Brief, Appellant submits that Bell does not teach or suggest heaters in a hydrocarbon containing layer in a formation, as suggested by the Examiner (see "**The Claims Are Patentable Over Eastlund In View of Van Egmond And/Or Bell**", pages 12-13 of the Appeal Brief). Appellant maintains that there is no teaching or suggestion in Eastlund for providing heat to **a hydrocarbon containing layer in the formation** as Eastlund merely teaches, as recognized by the Examiner, heating of hydrocarbon fluids in a well. Without some teaching or suggestion in **Eastlund** of providing heat to **a hydrocarbon containing layer in the formation**, Appellant submits that there is no teaching, suggestion, motivation, or objective reason within the references themselves or to one of ordinary skill in the art to combine the teachings of Eastlund and Van Egmond and/or Bell and render the combinations of features in the claims obvious (provided Bell can be proven to teach or suggest having heaters in the hydrocarbon containing layer in the formation).

In the Examiner's Answer, the Examiner states, in response to the above arguments, that:

> The appellant argues that Eastlund shows no portion of the heaters is even proximate to a hydrocarbon containing layer, but it is noted that Van Egmond further shows a heater cable (9, 10) that extends into the hydrocarbon containing layer formation as well as Bell which shows a conductive element 23 provided in the carbonaceous material layer where heat is provided throught[sic] the conductive element 23. The appellant argues that since Eastlund teaches of providing more heat in the upper level of the well, no heat is needed or provided in the lower portion of the well tubing as illustrated in Figures 1 and 7A wherein the bottom of the heater is shown to be distantly separated from the perforations 12 in view of the "long break lines" in Figures 1 and 7A. This argument is not deemed persuasive since it is noted that the drawing figures are for illustrated purposes, and the sizes and dimensions of the drawing figures are not in scale.
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> ("Response to Arguments" (Section 10), page 8).

Appellant recognizes that the "long break lines" (long, ruled thin lines with zigzags) used in Figures 1 and 7A (as well as other figures such as Figure 5A) are for illustrative purposes and that no dimensions or sizes are given in the disclosure of Eastlund. Appellant submits, however, that one skilled in the art would recognize that the long, ruled thin lines with zigzags in the figures represent distant separation (long breaks) between sections as the long, ruled thin lines with zigzags are an American Society of Mechanical Engineers standard for **long breaks** in technical drawings to delineate where an object is broken to save drawing space while freehand thick lines are used to delineate short breaks.

In addition, nowhere in the disclosure of Eastlund is there any teaching or suggestion for heating in the sections of the wellbore where perforations are shown (see, for example, perforations 12 in Figure 1, perforations proximate formation 56 in Figure 5A, and perforations 113 in Figure 7A). Any heat provided by the heater in the wellbore in these figures is provided in sections above and separated by the long break lines from the perforation sections. These perforation sections appear to be the sections of the wellbore proximate any hydrocarbon containing layer. Eastlund states: "At the lower end of the casing perforations 12 admit fluid from the formation into the well bore." (col. 3, lines 17-19); "In this system the well includes the

casing 55 extending down to the producing formation 56." (col. 7, lines 32-33); and "Production from the perforations 113 passes to the surface through the tubing 84." (col. 10, lines 18-19). As these perforation sections are shown to be at the lower ends of the wellbores and away from the heating sections, there is no teaching of providing heat to the hydrocarbon containing layer of the formation in Eastlund. Without such teaching in Eastlund, Appellant maintains that there is no teaching, suggestion, motivation, or objective reason to combine the teachings of Eastlund and Van Egmond and/or Bell and render the combinations of features in the claims obvious.

In the Examiner's Answer, the Examiner states that:

> Contrary to the appellant's argument, Eastlund does not show or teach that no heat is needed in the lower portion of the well. For example, Figure 5A in Eastlund illustrates a sinker (59) that is provided in close proximate to the perforations 56 where hydrocarbons are admitted there into, and based on this showing, a sinker (115) in Figure 7A could be provided proximate to the perforations 113 wherein the heater (106) which is connected to the sinker (115) would be positioned proximate to the perforations thereto where there is a hydrocarbon containing layer formation.
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> ("Response to Arguments" (Section 10), pages 8-9).

Eastlund states, however: "Within the well there is provided a pump 59 at the lower end of a conventional sucker rod 61 also constructed of steel up to the polish rod." (col. 7, lines 38-40). As is known in the art, pump 59 may be used to pump fluids to the surface. Additionally, as stated later, Eastlund teaches that pump 59 is located below any heating section. Eastlund states: "Below the fiberglass polish rod 62 insulators 73 are secured to the polish rod at spaced points to insulate and space the sucker rod 61 from the tubing along the length of the sucker rod from the polish rod down to the selected area at which it is desired to establish electrical contact between the tubing and casing to define the lower limit of heating of the tubing. Any desired structure may be used to establish this short between the sucker rod and tubing. In the preferred form, a wheeled contact system is used. The system includes a collar 75 which is fixed to the sucker rod." (col. 7, line 66 to col. 8, line 8). As shown in Figure 5A, pump 59 is clearly below collar 75 and separated by the long break lines and, thus, there is no teaching or suggestion of providing heat near any hydrocarbon containing layer. Appellant submits that the Examiner appears to be

merely picking and choosing from the disclosure and using hindsight reconstruction to deprecate Appellant's claimed invention.

In the Examiner's Answer, the Examiner states that:

> The appellant also argues that there is no motivation to combine with Eastlund and Van Egmond since Van Egmond appears to destroy the intent and purposes of Eastlund. The appellant argues Eastlund is shown to provide heating in the upper portions with no heating in the hydrocarbon containing layer whereas Van Egmond is shown to provide a significant heating in the hydrocarbon containing layer formation as shown as the zone 2 in Figure 1. This argument is not deemed persuasive since Eastlund also teaches for providing a heat at different selected depths of the well. Such disclosure does not support the appellant's statement that no heating is provided in the lower portion including in the hydrocarbon containing layer.
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> ("Response to Arguments" (Section 10), page 9).

While Eastlund may show heating at different depths in the well, Appellant has shown (see above) that Eastlund limits heating in the well to portions of the well distantly above any hydrocarbon containing layer. Thus, Appellant maintains that Eastlund does not teach or suggest providing heat near or proximate the hydrocarbon containing layer and that there is no motivation to combine the teachings of Eastlund with the teachings of Van Egmond to render the combinations of features in the claims obvious.

In the Examiner's Answer, the Examiner states that:

> With respect to Bell, the appellant argues that Bell shows applying a DC to an anode and a cathode of the conductive elements (23, 41) and that Bell does not show a resistive heating of the heater. It is noted that Bell is applied to show a well known well tubing that extends through an overburden into a hydrocarbon containing layer formation wherein Bell further shows mobilizing hydrocarbons including the in situ production of the gas wherein a heat is produced in the formations via the electrical current (column 1, lines 56-60).
>
> ("Response to Arguments" (Section 10), page 9).

The Examiner's Answer appears to support Appellant's argument that Bell does not show a resistive heater for heating the formation. Accordingly, Appellant submits that without any teaching for heating with resistive heating in the wellbore, there is no motivation to combine the teachings of Bell with the teachings of Eastlund and/or Van Egmond. As such, Appellant affirms that it appears that the Examiner is using hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate Appellant's claimed invention.

In the Examiner's Answer, the Examiner states that:

> This argument is not deemed persuasive since the appellant's argument is based on the embodiment shown in Figure 5 of Eastlund while the teaching of Rose is applied to modify the heater (106) of Eastlund as shown in the embodiment illustrated in Figure 12 where the system does not require providing current to the well tubing (see column 12, lines 37-47).
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> ("Response to Arguments" (Section 10), page 11).

Appellant allows that certain arguments presented in the Appeal Brief were based on the embodiment depicted in Figure 5. Appellant notes, however, that the Examiner, in a previous argument in the Examiner's Answer, applied the teachings of Figure 5A to the teachings of Figure 7A, which describes the embodiment of heater 106 also described in Figure 12 and Figures 8-11 (see Examiner's Answer, final paragraph beginning on page 8 and continuing onto page 9). Appellant thus submits that the teachings related to the embodiment depicted in Figure 5 may also be applied to the teachings related to the embodiments depicted in Figures 7-12.

Nevertheless, Appellant also submits that there is no teaching, suggestion, motivation, or objective reason to combine the teachings of Rose with the teachings of the embodiments depicted in Figures 7-12 of Eastlund. The Examiner states, in the Examiner's Answer:

> To one of ordinary skill in the art, it would have been obvious to modify the heater of Eastlund having an auto-regulating heater as shown in Rose since they are in the same field of endeavor which is in the field of utilizing an electrical heater and for heating a fluid or liquid involving an extensively long distance.
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> ("Response to Arguments" (Section 10), page 10).

Although both Eastlund and Rose teach heating fluids in long heaters to prevent freezing or the formation of solids, the embodiments depicted in Figures 7-12 of Eastlund have no teaching or suggestion for utilizing any ferromagnetic effect in the heater (heater cable 106). Eastlund merely describes a cable with "an inner conductor made up of several strands of wire 107 and an outer conductor made up of the wire braid 108. Between the inner and outer conductor a sheath of insulation 109 for electrically insulating the inner and outer conductor from each other is provided. The outer conductor is covered by a sheath of insulation 111." (col. 9, lines 53-59). Nowhere in the disclosure of Eastlund describing the embodiments depicted in Figures 7-12 is there any teaching or suggestion for using any ferromagnetic properties of the cable. Thus, Appellant submits that there is no teaching, suggestion, motivation, or objective reason to combine the teachings of Rose with the teachings of the embodiments depicted in Figures 7-12 of Eastlund without some suggestion within the teachings of the embodiments depicted in Figures 7-12 of Eastlund to utilize ferromagnetic properties of the material. Merely stating that "Eastlund shows an outer conductor made of steel" (see Examiner's Answer, page 10) does not provide sufficient reason to combine the teachings.

Further, if the teachings of Figures 1-6 of Eastlund are allowed to be applied to the teachings of Figures 7-12 of Eastlund, specifically, the utilization of the ferromagnetic properties described in the teaching of Figures 1-6 are applied to Figures 7-12; then, as stated in the Appeal Brief (see "**The Claims Are Patentable Over Eastlund In View Of Van Egmond And/Or Bell And/Or Rose**", pages 13-16 of the Appeal Brief), modifying the Eastlund device to operate at the Curie temperatures described by Rose would appear to make the Eastlund device unsatisfactory for its intended purpose as disclosed by the requirements for the Eastlund device.

In view of the above, it appears that the Examiner continues to use hindsight reconstruction to pick and choose among **isolated disclosures** in the prior art to deprecate Appellant's claimed invention without some teaching, suggestion, motivation, or objective reason to combine the teachings of the disclosures.

Appellant submits that the disclosures used in the rejections of the claims have no

recognition of the problem or any recognition of a need to solve the problem that is solved by the invention described in Appellant's claims. Appellant acknowledges that general heating of hydrocarbon containing layers is known in the art and various forms of heating formations have been used since shortly after World War II. Appellant submits, however, that the combination of features described in Appellant's claims are novel and solve problems heretofore not seen or recognized in the prior art.

As stated in Appellant's specification, the embodiments of temperature limited heaters described by Appellant's claims solve problems in the field of heating hydrocarbon containing layers in subsurface formations that are not recognized or solved in the prior art. For example, Appellant's specification states:

> Temperature limited heaters may be more reliable than other heaters. Temperature limited heaters may be less apt to break down or fail due to hot spots in the formation. In some embodiments, temperature limited heaters may allow for substantially uniform heating of a formation. In some embodiments, temperature limited heaters may be able to heat a formation more efficiently by operating at a higher average temperature along the entire length of the heater. The temperature limited heater may be operated at the higher average temperature along the entire length of the heater because power to the heater does not have to be reduced to the entire heater (e.g., along the entire length of the heater), as is the case with typical heaters, if a temperature along any point of the heater exceeds, or is about to exceed, a maximum operating temperature of the heater. Heat output from portions of a temperature limited heater approaching a Curie temperature of the heater may automatically reduce (e.g., reduce without controlled adjustment of alternating current applied to the heater). The heat output may automatically reduce due to changes in electrical properties (e.g., electrical resistance) of portions of the temperature limited heater. Thus, more power may be supplied to the temperature limited heater during a greater portion of a heating process.
>
> (Specification, page 156, line 6 to page 157, line 10).

Appellant recognizes that very different temperature limited heaters based on the Curie temperature have been previously used for other unrelated applications. For example, Appellant's specification states:

> Curie temperature heaters have been used in soldering equipment, heaters for medical applications, and heating elements for ovens (e.g., pizza ovens). Some of these uses are disclosed in U.S. Patent Nos. 5,579,575 to Lamome et al.; 5,065,501 to Henschen et al.; and 5,512,732 to Yagnik et al., all of which are

> incorporated by reference as if fully set forth herein. U.S. Patent No. 4,849,611 to Whitney et al., which is incorporated by reference as if fully set forth herein, describes a plurality of discrete, spaced-apart heating units including a reactive component, a resistive heating component, and a temperature responsive component.
>
> (Specification, page 159, lines 4-11).

The use of temperature limited heaters to heat hydrocarbon containing layers in subsurface formations, however, is not a matter of "routine experimentation to achieve a desired temperature" as suggested by the Examiner in the Examiner's Answer (page 11). Appellant's specification describes many factors in design and implementation that must be considered before temperature limited heaters can be used to heat hydrocarbon containing layers in subsurface formations (see Appellant's specification, page 159, line 13 to page 211, line 11). In addition, operating the heater at or near a selected temperature (for example, the Curie temperature) is not routine, as evidenced by the examples in Appellant's specification (see, for example, the examples found from page 219, line 28 to page 242, line 13 of Appellant's specification). Using temperature limited heaters to heat hydrocarbon containing layers in subsurface formations provides certain advantages over using non-temperature limited heaters, as shown by the simulation beginning on page 227, line 4 of Appellant's specification. For at least these reasons, Appellant submits that the disclosures used in the rejections of the claims have no recognition of the problem or any recognition of a need to solve the problem that is solved by the invention described in Appellant's claims.

For all of the above reasons stated in reply to the Examiner's Answer and the reasons stated in the Appeal Brief, Appellant submits that the combinations of features described in claims 1691, 1711, and 1731 are allowable over the art cited by the Examiner.

Claims 1692 and 1712

Claims 1692 and 1712 describe combinations of features including, but not limited to, the features of: "at least one production well extending into the hydrocarbon containing layer and

configured to produce at least some of the mobilized hydrocarbons from the hydrocarbon containing layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1693 and 1713

Claims 1693 and 1713 describe combinations of features including, but not limited to, the features of: "wherein at least one electrical conductor transfers heat during use to hydrocarbons in the hydrocarbon containing layer to at least mobilize some hydrocarbons in the layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1694 and 1714

Claims 1694 and 1714 describe combinations of features including: "wherein at least one electrical conductor transfers heat during use to hydrocarbons in the hydrocarbon containing layer to pyrolyze at least some hydrocarbons in the layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711. In addition, Appellant notes that the lower temperatures set forth in Eastlund (e.g., 73 °F to 115 °F (22 °C to 47 °C) *see* Eastlund col. 4, lines 39-44) would not be sufficient to pyrolyze at least some hydrocarbons in the formation, and thus Eastlund teaches away.

Claims 1695 and 1715

Claims 1695 and 1715 describe combinations of features including: "wherein at least one of the ferromagnetic sections heats during use to a temperature of at least about 650 °C." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711. In addition, Appellant notes that the lower temperatures set forth in Eastlund (e.g., 73 °F to 115 °F (22 °C to 47 °C) *see* Eastlund col. 4, lines 39-44) would not be sufficient to heat to a temperature of at least about 650 °C, and thus Eastlund teaches away.

Claims 1696 and 1716

Claims 1696 and 1716 describe combinations of features including: "wherein the AC supply is configured to provide AC at a voltage below about 2500 volts." Appellant respectfully

traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1699 and 1719

Claims 1699 and 1719 describe combinations of features including: "wherein at least one of the ferromagnetic sections comprises iron, nickel, chromium, cobalt, tungsten, or a mixture thereof." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1700 and 1720

Claims 1700 and 1720 describe combinations of features including: "wherein at least one of the ferromagnetic sections has a thickness of at least about ¾ of a skin depth of the AC at the Curie temperature of such ferromagnetic sections." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1701 and 1721

Claims 1701 and 1721 describe combinations of features including: "wherein the heat output below the selected temperature is greater than about 400 watts per meter of electrical conductor." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711. In addition, Appellant notes that Eastlund teaches a heat output of 31 watts per ft or 102 watts per meter (*see* Eastlund col. 4, lines 39-44), and thus Eastlund teaches away.

Claims 1702 and 1722

Claims 1702 and 1722 describe combinations of features including: "wherein at least a portion of the electrical conductor is longer than about 10 m." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1703 and 1723

Claims 1703 and 1723 describe combinations of features including: "wherein one or

more of the ferromagnetic sections are configured to sharply reduce the heat output at or near the selected temperature." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1704 and 1724

Claims 1704 and 1724 describe combinations of features including: "wherein the heat output from at least a portion of the ferromagnetic sections decreases at or near the selected temperature due to the Curie effect." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1705 and 1725

Claims 1705 and 1725 describe combinations of features including: "wherein the AC resistance of the electrical conductor increases with an increase in temperature up to the selected temperature, and wherein the AC resistance of the electrical conductor decreases with an increase in temperature above the selected temperature." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1706 and 1726

Claims 1706 and 1726 describe combinations of features including: "wherein the AC supply provides an electrical current of at least about 70 amps to the electrical conductor." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1707 and 1727

Claims 1707 and 1727 describe combinations of features including: "wherein at least one of the electrical conductors comprises a turndown ratio of at least about 2 to 1." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1708 and 1728

Claims 1708 and 1728 describe combinations of features including: "wherein the AC

supply applies AC at about 180 Hz." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1709 and 1729

Claims 1709 and 1729 describe combinations of features including: "wherein the system withstands operating temperatures of about 250 °C or above." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claims 1710 and 1730

Claims 1710 and 1730 describe combinations of features including: "wherein the electrical conductor automatically provides the reduced amount of heat above or near the selected temperature." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Claim 1732

Claim 1732 describes a combination of features including: "producing at least some of the mobilized hydrocarbons from the layer through a production well extending into the hydrocarbon containing layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1733

Claim 1733 describes a combination of features including: "wherein the transferred heat pyrolyzes at least some hydrocarbons in the hydrocarbon containing layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731. In addition, Appellant notes that the lower temperatures set forth in Eastlund (e.g., 73 °F to 115 °F (22 °C to 47 °C) *see* Eastlund col. 4, lines 39-44) would not be sufficient to pyrolyze at least some hydrocarbons in the formation, and thus Eastlund teaches away.

Claim 1734

Claim 1734 describes a combination of features including: "producing at least some of

the pyrolyzed hydrocarbons from the layer through a production well extending into the hydrocarbon containing layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731. In addition, Appellant notes that the lower temperatures set forth in Eastlund (e.g., 73 °F to 115 °F (22 °C to 47 °C) *see* Eastlund col. 4, lines 39-44) would not be sufficient to pyrolyze at least some hydrocarbons in the formation, and thus Eastlund teaches away.

Claim 1736

Claim 1736 describes a combination of features including: "wherein at least one of the ferromagnetic sections heats to a temperature of at least about 650 °C." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731. In addition, Appellant notes that the lower temperatures set forth in Eastlund (e.g., 73 °F to 115 °F (22 °C to 47 °C) *see* Eastlund col. 4, lines 39-44) would not be sufficient to heat to a temperature of at least about 650 °C and thus Eastlund teaches away.

Claim 1737

Claim 1737 describes a combination of features including: "providing the AC at a voltage below about 2500 volts." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1738

Claim 1738 describes a combination of features including: "providing the AC to at least one of the electrical conductors at or above the selected temperature." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1739

Claim 1739 describes a combination of features including: "providing the AC at a frequency of about 180 Hz." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1740

Claim 1740 describes a combination of features including: "providing an initial electrically resistive heat output when the electrical conductor providing the heat output is at least about 50 °C below the selected temperature, and automatically providing the reduced amount of heat above or near the selected temperature." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1741

Claim 1741 describes a combination of features including: "wherein an AC resistance of at least one of the ferromagnetic sections decreases above the selected temperature to provide the reduced amount of heat." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1742

Claim 1742 describes a combination of features including: "wherein at least one of the ferromagnetic sections has a thickness of at least about ¾ of a skin depth of AC at the Curie temperature of the ferromagnetic material." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1743

Claim 1743 describes a combination of features including: "wherein the reduced amount of heat is less than about 400 watts per meter of length of electrical conductor." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731. In addition, Appellant notes that Eastlund teaches a heat output of 31 watts per ft or 102 watts per meter (*see* Eastlund col. 4, lines 39-44) and thus Eastlund teaches away.

Claim 1744

Claim 1744 describes a combination of features including: "controlling a skin depth in at least one of the ferromagnetic sections by controlling a frequency of the applied AC." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1745

Claim 1745 describes a combination of features including: "applying additional current to at least one of the ferromagnetic sections as the temperature of such ferromagnetic sections increases until the temperature is at or near the selected temperature." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1746

Claim 1746 describes a combination of features including: "controlling an amount of heat provided by at least one of the ferromagnetic sections by controlling an amount of current applied to at least one of the electrical conductors." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claim 1747

Claim 1747 describes a combination of features including: "applying current of at least about 70 amps to at least one of the electrical conductors." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claim 1731.

Claims 1748, 1750, and 1752

Claims 1748, 1750, and 1752 describe combinations of features including: "wherein the heater well extends at least about 10 m into the hydrocarbon containing layer." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691, 1711, and 1731.

Claims 1749, 1751, and 1753

Claims 1749, 1751, and 1753 describe combinations of features including: "wherein the hydrocarbon containing layer comprises hydrocarbons configured to be treated and produced from the formation using an in situ conversion process." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims

1691, 1711, and 1731.

Second Ground of Rejection

The Examiner rejected claims 1698 and 1718 under 35 U.S.C. 103(a) as being unpatentable over Eastlund in view of Van Egmond, Bell, and Rose as applied to claims 1691-1696, 1699-1716, 1719-1734, and 1736-1753 above, and further in view of Canadian Patent No. 2,151,521 to Bridges et al. Appellant respectfully traverses these rejections in light of the following remarks.

Claims 1698 and 1718 describe combinations of features including: "wherein the system comprises three or more electrical conductors, and wherein at least three of the electrical conductors are coupled in a three-phase electrical configuration." Appellant respectfully traverses this rejection for at least the reasons given in the discussion of the rejection of independent claims 1691 and 1711.

Third Ground of Rejection

The Examiner provisionally rejected claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1691-1749 of copending U.S. Pat. Appl. No. 10/693,700 or claims 1691-1759 of copending U.S. Pat. Appl. No. 10/693,840. Upon the present application being in condition for allowance but for the double patenting rejections, Appellant will provide a terminal disclaimer.

IV. CONCLUSION

For the foregoing reasons, it is submitted that the Examiner's rejections of claims 1691-1696, 1698-1716, 1718-1734, and 1736-1753 were erroneous, and reversal of Examiner's decision is respectfully requested.

An authorization for the reply brief fee will be made upon electronic submission of this document. If any extension of time is necessary, Appellant hereby requests the appropriate extension of time. If any fees are omitted or if fees have been overpaid, please appropriately charge or credit those fees to Meyertons, Hood, Kivlin, Kowert & Goetzel P.C., Deposit Account No. 50-1505/5659-20900/EBM.

Respectfully submitted,

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